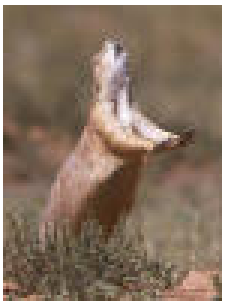

PLAGUE

Information for Arizona Physicians and Health Care Workers

Revision: August 2007

Dear Colleagues:

Evidence of plague activity (*Yersinia pestis*) has recently been reported in your area, and the potential for seeing human infections has increased. Please report any suspected plague cases to epidemiology staff at your local health department, or to the Arizona Department of Health Services at (602) 364-4562.

Plague Transmission

Human plague can be acquired in three ways:

(1) By the bite of a plague-infected fleas. Flea bites are the most common mode of transmission, and typically occur during the warmer months of the year. Rodent fleas may be transferred from pets to people.

(2) By direct contact with blood, saliva, draining abscesses, or tissues from plague-infected animals. Direct contact results from handling and skinning infected rodents, rabbits or carnivores or bites or scratches from infected pets, especially sick cats.

(3) By the respiratory route. Bacteria in respiratory droplets or secretions of coughing humans or animals with plague pneumonia can spread directly to those caring for the person or animal.

Clinical Recognition of plague

(1) Bubonic plague accounts for 75% of cases. Patients typically develop symptoms of bubonic plague 2 to 8 days after being bitten by an infected flea. There is sudden onset of fever, chills, and weakness and the development of an acutely swollen tender lymph node, or bubo, up to one day later. The bubo most typically develops in the groin, axilla, or cervical region depending on where the flea bite occurred, is 1 to 10 cm in diameter and often has marked surrounding erythema and edema. Bacteremia develops frequently and can lead to secondary septicemic plague.

(2) Septicemic plague accounts for 20-25% of cases. No detectable bubo is found (although it may be present in a location inaccessible to palpation). Septicemic plague has no specific features by which it can be distinguished from community-acquired sepsis of other etiologies, although abdominal pain, vomiting and diarrhea are common. The case-fatality rate for primary septicemic plague is significantly higher than for uncomplicated bubonic plague. Unless treated early, endotoxemia quickly develops resulting in a systemic inflammatory response syndrome with bleeding, shock, and organ failure.

(3) Pneumonic plague accounts for less than 5% of cases. The incubation period of primary plague

pneumonia is 1-3 days after close exposure to a sick animal or human. Patients commonly have symptoms of severe bronchopneumonia, chest pain, dyspnea, cough, and hemoptysis. Some patients have also had prominent gastrointestinal symptoms including nausea, vomiting, abdominal pain, and diarrhea.

(4) Metastatic Complications of Plague: Patients with bubonic and septicemic plague may develop metastatic foci in the meninges or the lungs. Therefore, plague pneumonia can complicate bubonic or septicemic plague. Plague pneumonia is rapidly progressive and may be difficult to distinguish from pulmonary complications of septicemic disease (ie, adult respiratory distress syndrome). Meningeal plague has the clinical and laboratory features of acute bacterial meningitis.

Laboratory Diagnosis

There are no widely available rapid tests for plague, although laboratory diagnoses can be made more quickly if most or all appropriate specimens are collected (see below). Epidemiology staff at county and/or state health departments can provide consultation, and the Arizona State Health Laboratory (ASHL) can assist with laboratory testing (see address at the end of this document).

(1) **Bacterial culture** of the organism confirms the diagnosis. Culture can only be initiated before antibiotics are given and can be performed on blood, CSF for meningitis cases, sputum or BAL for pneumonic cases, draining lesions or bubo aspirate. Cultures should be done on both blood agar and chocolate blood agar (to look for tularemia which can have a clinical presentation similar to plague). *Y. pestis* may take 48 hours or longer to grow in culture.

a. **Procedure for obtaining a bubo aspirate**: We recommend using a 5 or 10cc syringe with a 19 or 20 gauge needle. There is often a large amount of surrounding edema so care must be taken to be sure the bubo is aspirated. Often, a small amount of serous material is obtained; frank pus is less common. If little or no fluid is aspirated, 1 cc of **non-bacteriostatic** saline solution should be injected into the bubo and then aspirated back into the syringe. The syringe and intact needle should then be hand carried to the laboratory where inoculation of media and glass slide preparation should be done under a hood for Gram stain and fluorescent antibody testing.

(2) **Gram staining** of the bubo aspirate and/or material from a draining lesion should be performed. *Y. pestis* organisms are Gram-negative, coccobacillary organisms which may show bipolar staining.

(3) **Fluorescent antibody (FA)** staining can be performed at the ASHL. The FA test is highly specific and sensitive (if plague organisms are present). FA staining should be done on specimen material from bubo aspirate, draining lesions, CSF, sputum and/or throat swabs. The specimen should be carefully expressed onto several different clean glass slides in the laboratory under the hood.

(4) **Serology** is available, but will not confirm diagnosis until acute and convalescent sera are obtained. Convalescent serum should be collected at least 2 weeks after the acute specimen. *An acute serology alone is of little benefit and the state lab will not test it without a paired convalescent sample.*

Treatment

Selection of an antibiotic regimen depends upon the clinical form of disease and the severity of illness. Since plague is a severe infection (with high case fatality rate if not treated early and appropriately), antibiotics should be started immediately once diagnostic specimens are collected.

(1) **Streptomycin** continues to be recommended as the drug of choice for treatment of plague though it may be difficult to obtain.

(2) **Gentamicin** is also used and has been shown to be just as effective.

(3) **Doxycycline and tetracycline** are also first-line drugs and may be given in conjunction with an aminoglycoside.

(4) **Chloramphenicol**, because of its high tissue penetration, has been used to treat cases of plague meningitis and pleuritis.

Consultation with an infectious disease physician is recommended.

Isolation

Exposures of hospital personnel when plague patients first present in emergency rooms can be prevented if precautions are taken from the start, even before any workup is initiated.

(1) Droplet precautions should be initiated when there is a suspect plague case, including the use of surgical masks, latex gloves and gowns when within two meters of the patient.

(2) Any potential exposures to the general public in the waiting room should be noted. *Names and phone numbers should be recorded in case the exposed individuals need to be offered prophylaxis*

(3) Droplet isolation should be continued until after 48 hours of appropriate antibiotic therapy with clinical improvement, unless there is evidence of plague pneumonia by symptoms, physical examination or chest radiograph. Release of pneumonic plague patients from droplet isolation should be individualized.

For more information on plague visit the Centers for Disease Control & Prevention **(CDC)** website at http://www.cdc.gov/ncidod/dvbid/plague/index.htm.

(Adapted from guidelines prepared by New Mexico Department of Health)

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